

Brass Metal Cookware Associated Lead Poisoning Presenting as Recurrent Abdominal Pain: A Case Report

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ABSTRACT

Lead is known to exert toxic effects on nearly all tissues and organ systems, with the nervous, gastrointestinal, and haematopoietic systems being particularly vulnerable. In humans, lead interferes with haemoglobin synthesis, leading to anaemia, and its disruption of porphyrin metabolism can trigger abdominal pain due to vasospasm. Cases due to lead poisoning are an uncommon presentation in healthcare facilities and often overlooked as a cause of anaemia and abdominal pain. Although occupational exposure remains a well-established source of lead poisoning, non-occupational factors, such as the use of metal cookware, are gaining importance as potential contributors in daily life. We report a case of a 48-year-old man presenting with a two-month history of crampy abdominal pain, fatigue, and constipation. After a detailed history and physical examination, other possible causes were excluded and revealed his recent use of a new cookware to ferment rice. Subsequent testing showed an elevated blood lead level of 87.2 µg/dL. The patient recovered after chelation therapy. Lead poisoning can cause nonspecific symptoms like abdominal pain, anaemia, and neuropathy, often leading to misdiagnosis. Delayed diagnosis may result in irreversible harm. It should be considered in emergency cases of unexplained abdominal pain after ruling out common causes. This case highlights the importance of paying attention to subtle, often overlooked aspects of a patient's daily routine. Maintaining a broad differential diagnosis and asking targeted questions can be crucial in identifying uncommon causes and achieving a timely, potentially life-saving diagnosis.

Keywords: Anaemia, Colicky, Heavy metal toxicity, Penicillamine

CASE REPORT

A 48-year-old male with no comorbidities presented to the department with recurrent, increasingly severe central abdominal pain, colicky in nature, lasting for several hours with no relation to food for two months. He had anorexia, nausea, fatigue and constipation (Bristol Stool Chart Type 1/2 stools once a day). He had no history of vomiting, jaundice, fever, or gastrointestinal bleed. He had a 5 kg weight loss. During these episodes, the patient became agitated and confused, accompanied by marked elevations in blood pressure ranging from 150/105 to 170/110 mmHg, with an average BP recording of 160/110 mmHg. Physical examination revealed pallor and mild motor weakness in both legs. BP was 160/100 mmHg in the right upper limb, lying with no significant postural drop.

Blood tests [Table/Fig-1,2] revealed a haemoglobin level of 6.5 g/dL, a normal Mean Corpuscular Volume (MCV) of 85.7 fL, and a white blood cell count of 4,000 cells/mm³. Liver function tests and serum electrolytes were within normal limits, as were iron studies. He had already undergone an extensive workup at another hospital-including gastroscopy, colonoscopy, contrast-enhanced CT of the abdomen, MR enterography, and capsule endoscopy, all of which returned normal results. Despite this thorough evaluation, his symptoms returned just a week after being discharged.

On taking a detailed history, he revealed that he started using brass metal cookware bought three months ago to ferment cooked rice with water overnight and drank the supernatant liquid in the mornings. With this information, lead poisoning was suspected. Peripheral smear showed normocytic normochromic anaemia with no basophilic stippling. Serum lead level was high (87.2 µg/dL). Bone marrow biopsy showed hypocellular marrow and ring sideroblasts. The patient was started on D Penicillamine 250 mg thrice daily. He was reviewed at OPD after a month and showed significant improvement in symptoms, including resolution of

Investigation	Value
Haemoglobin	6.5 g/dL
WBC	4000 cells/mm ³
MCV	85.7 fL
Platelet	2.83 lacs/mm ³
PT	11.7 seconds
INR	1.04
Reticulocyte count	4.2%
LDH	123 U/L
Serum creatinine	0.6 mg/dL

[Table/Fig-1]: Blood count and basic investigation. WBC: White blood cell; MCV: Mean corpuscular volume; PT: Prothrombin time; INR: International normalized ratio; LDH: Lactate dehydrogenase

Study	Value	Normal Range
Serum lead level	87.2 µg/dL	Less than 10 µg/dL
Urine porphobilinogen	Negative	-
Plasma metanephrine (pg/dL)	7.5	0-65
Serum calcium (mg/dL)	8.4	8.8-10.6
Ferritin (µg/L)	491	24-336

[Table/Fig-2]: Lead and trace mineral investigations.

abdominal pain, normal bowel function, and reduction in fatigue and agitation. Haematological evaluation revealed significant improvement in anaemia, with haemoglobin rising to 11.5 g/dL. Toxicological analysis of water kept overnight in the cookware used by the patient confirmed the presence of lead in the utensil.

DISCUSSION

Cases due to lead poisoning are an uncommon presentation in healthcare facilities. Lead has been reported to cause toxic effects

on all body tissues and organs, with the nervous system, digestive system, and haematopoietic systems being the most affected [1,2]. In humans, lead inhibits haemoglobin synthesis and causes anaemia; disruption of porphyrin metabolism causes abdominal pain from vasospasms; interferes with γ -Aminobutyric Acid (GABA) function, and affects the nervous system [3,4]. Abdominal pain is a common clinical symptom in adults, often arising from a wide range of non-specific causes, making it prone to being overlooked or misdiagnosed [5].

In our case, the patient had recurrent abdominal pain, anaemia and weight loss. Lead poisoning cases with similar symptoms have been reported by Yang Y et al., (2020) and Tsai MT et al., (2017) and the patients had the blood lead level of 52.8 $\mu\text{g}/\text{dL}$ and 62.8 $\mu\text{g}/\text{dL}$, respectively [5,6]. Based on published reports, cases with abdominal pain had blood lead levels ranging from 52.8 $\mu\text{g}/\text{dL}$ to 104 $\mu\text{g}/\text{dL}$ [5-7]. In our case, the initial blood lead level of the patient was 87.2 $\mu\text{g}/\text{dL}$. According to the CDC, the upper limit for blood lead in adults is 10 $\mu\text{g}/\text{dL}$ and for children 3.5 $\mu\text{g}/\text{dL}$ [8,9]. However, no level of lead in the blood is considered completely safe; even concentrations as low as 3.5 $\mu\text{g}/\text{dL}$ have been linked to reduced intelligence, behavioral issues, and learning difficulties in children [9].

Studies have shown that the common manifestations of lead poisoning include abdominal pain, anaemia, and bluish-black discolouration on the gums (Burton line) [7,10,11]. Burton lines are typically seen in chronic cases of lead poisoning [6]; however, in our patient, these gum lines were absent. This absence may be attributed to the relatively short duration of the patient's exposure to lead. Consistent with our findings, many lead poisoning cases undergo repeated hospitalisations, extensive diagnostic evaluations, medication assessments, and, in some cases, even laparotomies, often without clinical improvement. Several studies of abdominal pain, including endoscopy, ultrasonography, and abdominal computed tomography, often yielded no significant or abnormal findings [6,7,12,13].

High blood lead concentrations have a neurotoxic effect and have been documented to be associated with encephalopathy, confusion, headaches and seizures [6,14]. Lead exposure has also been reported to be linked to the development of hypertension and an increased risk of cardiovascular disease, effects that appear to result from multiple mechanisms, including elevated serum renin levels and activity, as well as neuropathic changes involving the peripheral autonomic nervous system [6,14]. In our case, the patient presented with agitation, confusion, and elevated blood pressure, findings consistent with those described in published reports.

Workplace-related exposure to lead has been indicated as a leading cause of lead poisoning in adults. However, cases linked to non-occupational sources like contaminated traditional medicines and cookwares have also been documented [15,16]. In the study by Fellows KM et al., (2025), they found that metal cookware is a potential source of lead exposure and demonstrated that aluminum cookware products, hindalium pans, brass cook pots released high levels of lead and leached a significant amount of lead during simulated cooking and storage [17]. Acidic foods have been reported to enhance the leaching of metals during cooking [18]. During the fermentation process, the gradual drop in pH (ranging from 2.7 to 5.6) occurs due to the production of organic acids such as lactic acid, acetic acid, and butyric acid [19]. In the present case, the acidic pH of the fermented rice water and prolonged contact time (8-12 hours) with the metal could have caused the leaching

of lead from the brass cookware. In our case, having a high index of suspicion and eliciting a history of recent change of cooking vessel gave a suspicion for lead poisoning, which was confirmed with blood lead levels that were high (87.2 $\mu\text{g}/\text{dL}$). Removal of the source of poisoning and chelation therapy are crucial strategies for cure [7].

CONCLUSION(S)

Lead poisoning remains an often-overlooked diagnosis because of its vague and non-specific clinical presentation. This case emphasises the vital role of detailed history-taking and the need to consider lead poisoning when evaluating patients with recurrent, unexplained abdominal pain and anaemia. With the increasing use of traditional and unconventional utensils or remedies, it is essential to consider causes beyond the usual suspects. Prompt identification and elimination of the exposure source, combined with timely chelation therapy, can result in significant clinical improvement. This case underscores that in medical practice, attention to subtle details and asking targeted questions are as crucial to accurate diagnosis as appropriate diagnostic testing.

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